Government of Saskatchewan

Annual Report 1984 - 85

Saskatchewan Energy and Mines

for the fiscal year ending March 31, 1985

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Letters of Transmittal

The Honourable Frederick William Johnson
Lieutenant-Governor
Province of Saskatchewan

Dear Sir:

I have the honour to submit herewith the Annual Report of Saskatchewan Energy and Mines for the fiscal year ending March 31, 1985.

Respectfully Submitted,

Paul Schoenhals

Honourable Paul Schoenhals,
Minister of Energy and Mines

Honourable Paul Schoenhals,
Minister of Energy and Mines
Province of Saskatchewan

Dear Sir:

I have the honour to submit, for your consideration, the Annual Report of Saskatchewan Energy and Mines for the fiscal year ending March 31, 1985.

Respectfully Submitted,

Bob Reid

Bob Reid
Deputy Minister
Saskatchewan Energy and Mines

Deputy Minister's Introduction

Expanded promotion of the development of Saskatchewan's mineral industry was a primary goal of the government in 1984-85. Saskatchewan Energy and Mines played a leading role in pursuit of this goal.

Energy and Mines staff faced an increased workload during the year due to continued high levels of industry activity and demand for the development of responsive government policies. I commend all of our staff members for their excellent performance and I thank them for their special contribution toward our goal.

Saskatchewan was instrumental in developing the Western Accord, an energy agreement made between the federal government and the western producing provinces in March, 1985. The Western Accord provided for the deregulation of oil prices and changes to taxation. These measures, combined with provincial oil and gas policies should ensure the continued high level of activity in Saskatchewan's energy industry.

Drilling activity remained strong during the past year with 2,970 wells drilled, up considerably from 1983 when 1,843 wells were drilled.

Oil production increased due to more drilling activity and a continuation of strong markets. Saskatchewan produced 68 million barrels of oil in 1984 compared to 60 million barrels produced in 1983. A net increase in remaining recoverable reserves was recorded for the second year in a row, approximately fifteen years since such an increase was recorded.

Land sale interest reached new heights in 1984. Bonus bid revenue of $123.7 million was received, compared to $108.3 million received in 1983. Growing land sale interest is a good indicator of future industry activity.

While conventional drilling activity dominated the oil exploration and development scene, significant Enhanced Oil Recovery, (EOR) efforts were initiated in 1984. Shell Canada announced a $20 million carbon dioxide flood pilot project for the Midale Unit in southeast Saskatchewan. This project is the first of its kind in the province. If successful, it will greatly extend the life of many of our light and medium gravity oil pools. Husky Oil Operations Ltd. also announced plans for an EOR project, the first commercial scale steamflood project, in the Aberfeldy pool near Lloydminster. The Aberfeldy steamflood project will eventually provide feedstock for the planned Bi-Provincial Upgrader at Lloydminster. In addition to the EOR efforts, the Dodsland area saw a major move to secondary or waterflood recovery with the implementation of several pilot and full-scale projects. All of these projects form a distinct trend toward creating a more secure future for the province.

Saskatchewan natural gas development made a major advance in 1984-85. Arrangements were made to limit planned imports of natural gas from Alberta and a series of fieldgate price increases for Saskatchewan natural gas production was established. As a result of these measures, production of marketable gas sold to Saskatchewan Power Corporation, (SPC) for domestic requirements rose to 43.9 billion cubic feet in 1984. This production figure represented 43.4 percent of SPC's requirements, up from 33.2 percent in 1983. The move to import less Alberta gas is positive in light of its higher cost; $2.95 per thousand cubic feet compared to an average cost of $2.51 for new Saskatchewan gas.

Natural gas drilling activity rose from 159 wells in 1983 to 444 wells in 1984. Sales of gas prone lands rose from $5.22 million in 1983 to $10.89 million in 1984. These increased land sales reflect the ever increasing interest in exploration and development of Saskatchewan's natural gas resource.

The implications of expanded provincial gas development are very significant to our future resource base. Saskatchewan has begun to formulate policies aimed at achieving self-sufficiency in gas production by early in the next decade. Self-sufficiency means that the province will have greater control over the price of our gas supplies. Another benefit will be the industrial growth associated with the natural gas industry.

Another new initiative resulting from the province's goal of expanded energy development is the plan to build two heavy oil upgraders in Saskatchewan. Behind these plans, our objectives are to keep producing heavy oil when diluent is in short supply and to contribute to our energy security by refining our own heavy oil feedstock as lighter reserves deplete. A joint project is planned by the provincial and federal governments in conjunction with Federated Co-operatives Ltd. A 50,000 barrel per day upgrader is expected to be built at the site of the Co-op Refinery in Regina. During the year, a feasibility and technical study was made in anticipation of the project's construction phase slated to begin in late 1985. The $650 million Co-op upgrader will be a major provincial development project. It is estimated that the project will create approximately 2,980 person years of direct employment. Ongoing industry activity will be enhanced through the upgrader's use of Saskatchewan medium and heavy crude oil in the production of synthetic crude, gasoline and other light oil products. A second joint project was initiated in June, 1984 when the province reached agreement with the Alberta and federal governments and Husky Oil to construct a 54,000 barrel per day upgrader at Lloydminster.

The government's Heavy Oil Project was established to form guidelines for heavy oil development in terms of environmental impact. Individual studies based on consultation with industry and all levels of government have begun and will continue next year. The studies will result in policy changes and a regulatory framework tailored to the technology of heavy oil development.

Further efforts to secure Saskatchewan's energy future were continued in 1984-85 with the Heavy Oil/Fossil Fuels Research Program. The program provided over $3.3 million in funding to twenty-one research projects to assist in eliminating the technical barriers hindering the expanded production and use of Saskatchewan's large reserves of heavy oil and lignite coal. The knowledge gained as a result of these projects, combined with other facets of the government's heavy oil strategy will help make heavy oil a major contributor to the province's economy in coming years.

Long term planning is key to the development of Saskatchewan's other mineral resources as well. Discussions with industry representatives on the replacement of the Potash Resource Payment Agreements, (PRPA) were completed in 1984-85. Our new, revised PRPA, extended two years to December 31, 1986, are aimed at maintaining revenues. New measures put in place more appropriate transportation deductions which should generate more revenue for the province. The revised PRPA are also designed to develop long-term markets and improve the province's competitive position by encouraging research to lower costs.

In terms of production and sales tonnage, 1984 was an excellent year for the Saskatchewan potash industry. Production increased by 29 percent and total sales by 6 percent. Offshore sales were particularly good, surpassing by 18 percent the previous record high established in 1980. However, overall profitability of the industry remained low due to world prices.

Sales of uranium also suffered due to pricing. The spot market quoted in U.S. dollars set new record lows in 1985. However, the strength of the U.S. dollar partially offset this price decline to Canadian producers. Key Lake is now producing at less than capacity: 10.5 million lbs. U_3O_8 annually. Saskatchewan remains the largest producer of uranium in the western world, accounting for about 16 percent of total production. Cluff Lake, Phase II is in production and the Collins Bay - B Zone is scheduled to begin production by the end of spring, 1986. Saskatchewan's total uranium reserves were increased substantially by additional reserves at Cigar Lake which now stand at 385 million lbs. U_3O_8.

Uranium exploration expenditures decreased slightly in 1984 to $25 million or about 70 percent of total uranium exploration expenditures in Canada. Uranium accounts for about two-thirds of the province's total mineral exploration expenditures.

Activity in the base and precious metal sector increased by 16 percent in 1984 with expenditures of $10.2 million. Much of this activity was concentrated on gold exploration, particularly in the area northeast of La Ronge. One or two properties are currently considering production decisions. The increased level of activity can be attributed in part to taxation incentives introduced in the Mineral Industry Recovery Program included in last year's budget. Gold exploration expenditures reached an all time high of $6 million, up two million dollars from 1983.

Amendments to The Mineral Disposition Regulations, 1961, were drafted in consultation with industry representatives. The amendments simplify and clarify the disposition regulations. They also provide tax incentives for base and precious metal producers in the form of accelerated write-off capabilities and provisions for recovering historical exploration expenditures.

Legislative reform became a priority in the department when it was recognized that some departmental legislation was constitutionally out of date or was generally cumbersome or inefficient for today's industry practices. A white paper was circulated and industry consultations were held concerning two new statutes proposed to replace the current mineral resources legislation.

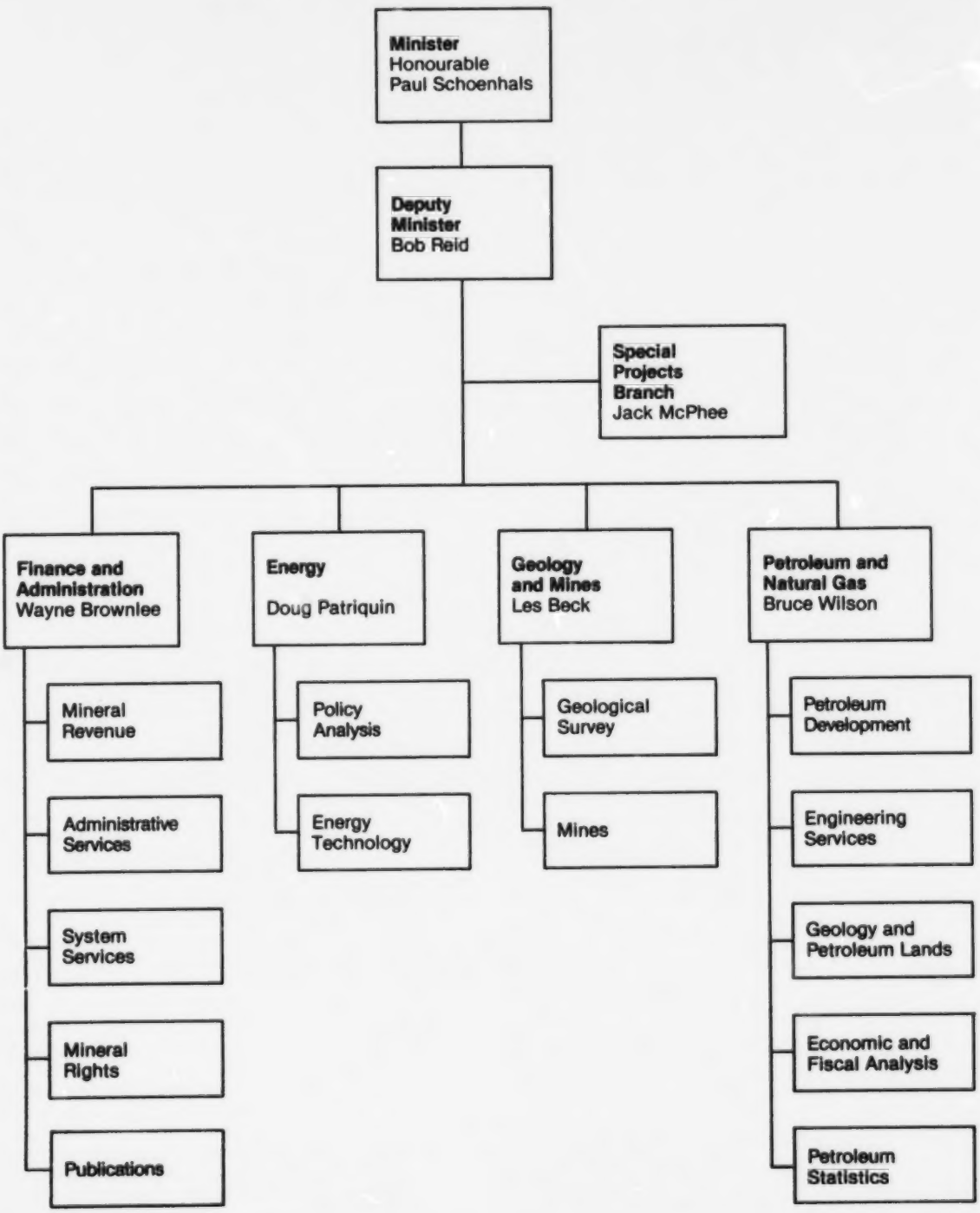
The Mineral Resources Act, 1985 and The Crown Minerals Act will be introduced to more clearly separate the province's legislative powers in non-renewable resource matters from its power as the owner of mineral rights. The Mineral Resources Act, 1985 will also incorporate new provincial powers flowing from the constitutional changes agreed to in 1982. The two new statutes will also allow for the repealing of some obsolete or redundent legislation, and generally will reflect the more modern administrative practices of the department.

Respectfully submitted,

Bob Reid

Bob Reid

Organization Chart



Finance and Administration Division

Wayne Brownlee
Assistant Deputy Minister

The Finance and Administration Division is responsible for mineral revenue collection and audits, internal administration and personnel, legislative co-ordination, communication, mineral rights, system services and publications.

The Finance and Administration Division is now composed of five branches:

- Mineral Revenue
- Administrative Services
- Mineral Rights
- System Services
- Publications

Mineral Revenue Branch

The Mineral Revenue Branch is responsible for collecting, recording and accounting for the various resource revenues owing to the province. The branch:

- ensures that revenues and accompanying returns and reports are received when due;
- assesses certain kinds of resource revenues on an annual or periodic basis;
- assesses interest and/or penalties on late payments and overdue returns;
- processes revenues through computer and manual systems, as input to financial and management information reports;
- audits resource companies to ensure compliance with taxation legislation;
- maintains historical records of all resource revenues received by the department;
- prepares special reports for use by department officials;
- informs the resource industry of its responsibilities under existing legislation and changes thereto;
- maintains close liaison with other branches of the department on revenue matters.

This branch is divided into two sections: revenue processing and revenue monitoring. Revenue processing is responsible for maintenance of the taxroll, receiving and recording of revenue, verification and processing of revenue returns, billing of various royalties, rentals and taxes, taxpayer information and assistance relating to resource taxation legislation, requirements and procedures, maintenance of computer systems and their interface with other department and government systems, and processing and payment of incentive grants, compensation payments and payments to holders of trust certificates.

Revenue monitoring is responsible for office and field audits in all resource revenue areas, follow-up of delinquent returns, collection of accounts receivable and informing taxpayers of resource taxation legislation. An added responsibility is the administration of the NORP and NOPS supplement programs.

The main objectives of the branch are to ensure that resource revenues owing to the province are received when due, that the amounts paid are correct and properly accounted for, and that data are availble on a regular and accurate basis for preparation of financial reports. To attain these objectives, the branch is committed to a continuous program of review and improvement to existing systems and procedures or to the development of new systems.

Other objectives included continued and improved communication with taxpayers and the resource industry, greater involvement in policy decisions affecting resource revenues, and training and upgrading of staff to improve the branch's efficiency.

Legislation

The Mineral Revenue Branch administers numerous acts, regulations and agreements. Among the more significant are:

The Mineral Resources Act, 1985
- The Petroleum and Natural Gas Regulations, 1969
- The Oil and Gas Incentive Regulations
- The Mineral Dispositions Regulations, 1985 including Uranium Royalties
- The Delayed Payment Charge Regulations, 1970

The Oil Well Income Tax Act and Regulations

The Freehold Oil and Gas Production Tax Act and Regulations

The Mineral Taxation Act, 1983
- The Freehold Coal Production Tax Regulations
- Regulations pertaining to Mineral Rights Tax

The Crown Minerals Act, 1985

The Potash Resource Payment Agreement

Revenues

An increase of 14 percent in total resource revenues was experienced during this fiscal year. Total revenue during 1984-85 amounted to $871.6 million, an increase of $107.1 million over 1983-84.

Source of Revenue	1984-85	1983-84	Percent Increase (Percent Decrease)
Heritage Fund			
Oil and Gas	$750,009,211	$689,129,078	8.8
Potash	71,176,437	39,702,048	79.3
Uranium	25,169,013	11,117,402	126.4
Other Minerals	19,495,501	18,069,710	7.9
Total	$865,850,162	$758,018,238	
Consolidated Fund			
Mineral Land Tax	$ 3,762,329	$ 3,765,448	(0.1)
Interest and Penalty Charges	2,858	2,104	35.8
Sales, Services, etc	306,699	223,680	37.1
Receipts from other Governments	1,700,735	2,469,338	(31.1)
Total	$ 5,772,621	$ 6,460,570	

Incentives and Compensations

Payments under The Oil and Gas Incentive Regulations during the year were $21.9 million, compared with $35 million in 1983-84.

Compensation payments to former mineral owners were $2.6 million in 1984-85 as compared to $2.3 million 1983-84.

Certain mineral rights surrendered to the Crown were encumbered by gross royalty trust certificates. As these lands are leased and brought into production, the branch pays the applicable gross overriding royalty. Payments in 1984-85 totalled $187,031 compared to $102,389 in 1983-84.

Number of Accounts	Type of Account	Reporting Frequency
12,000	Operator Statements	Month
124	Net Royalties	Month
9,000	P & NG Lease Rentals	Annual
50	Mineral Lease	Month
660	Oil Well Income Tax	Annual
40	Compensatory Royalties	Month
25	Potash	Month/Quarter/Annual
45	Uranium and Sodium Sulphate	Month/Quarter/Annual
800	Coal	Month/Quarter/Annual
500	Quarrying	Month/Quarter/Annual
70	Salt and Other Minerals	Month/Quarter/Annual
1,100	Mineral Rights Tax	Annual
110	Miscellaneous Sales	Month

Administrative Services Branch

This branch's main objective is to facilitate the delivery of departmental programs by providing administrative support services efficiently and effectively. Responsibilities include: management of the Accounts, Drafting and Purchasing Sections; human resources management; and in 1984-85, two special projects in personnel and productivity.

Accounts Section

Financial management for the department is co-ordinated through this section. Key responsibilities are to assist in the development of the budget and expenditure control. A new, computerized budget and expenditure system implemented during the year improved the department's financial efficiency. In addition, expenditures are forecasted and additional funds are obtained where necessary. As priorities change, the reallocation of funds is handled through Accounts. The section is also responsible for all accounts payable and the maintenance of financial records.

Drafting Section

Services integral to Saskatchewan's energy and mining industries are supplied through this section. Items produced are: quarterly land sale packages; drafts and blueprints of well, pool and mineral disposition maps; and design and layout of diagrams and figures for technical reports.

Purchasing Section

This section controls the department's office space by ensuring that the space is of adequate area. Purchasing also co-ordinates physical moves and helps plan office layout and design. As well, the section manages office equipment, furniture and supplies. This includes: the ordering and placing of furniture; maintenance of a central stockroom; supply of telephones, photocopiers and word processing equipment; co-ordination of the CVA fleet; and the processing of print requests.

Human Resources

The Administrative Services Branch plays an important role in the field of human resources by providing advice on administrative matters to all staff. As well, the branch initiates and co-ordinates training and staff development. A liaison function is performed by the branch in representing the department with central agencies such as Finance, Supply and Services and Personnel to procure funding, supplies and services.

Special Projects

During the 1984-85 year, a central personnel branch was set up requiring Administrative Services to assist in the amalgamation of the department's personnel branch with the central branch. Part of this project is the provision of an ongoing evaluation of service.

The second special project initiated during the year was the development and co-ordination for the department of the government's Productivity Improvement Project. Activities included: determination of the review process; formation of a management committee and obtainment of employee involvement; development of recommendations for new initiatives through employee committees; obtainment of management approval; implementation of new initiatives; and an ongoing review and evaluation of the project's effectiveness.

System Services Branch

System Services provides planning, management, consulting and co-ordination support functions for the development of new and the maintenance and operation of existing information systems for the department. This includes responsibility for the evaluation and acquisition of computer hardware and software, data-entry, data security and the development and management of the department's computer services budget.

System analysis, development and maintenance are performed by branch staff or co-ordinated with System Centre analysts. The department currently runs eighteen computer systems on a regular production basis. The applications vary from revenue accounting, royalty simulation and forecasting to production accounting and statistics. Along with the standard application development tools, software packages such as SAS, Mark IV, APL and plotting are used extensively.

The automated processes use a variety of equipment and computers. The branch operates a remote job entry terminal that provides the communications link between the department and SaskCOMP computers. In addition, several on-line terminals and micro computers are available for on-line data processing, program development and maintenance.

The major projects undertaken this year were:

1. Development work for the Well Information System was started. The first phase will be implemented in 1985-86 and will run at SaskCOMP Regina Regional Centre.
2. The Oil and Gas Revenue Billing System was designed and developed. Implementation will start with the June, 1985 production data.
3. A super-micro computer was installed to support the department's APL processing requirements.

Mineral Rights Branch

The Mineral Rights Branch is concerned with mineral land ownership and records. Comprised of three sections, its responsibilities are outlined as follows:

Mineral Land Ownership Section

- maintains a computerized freehold mineral land ownership base for all taxable parcels of mineral lands that are assessed a mineral land tax;
- prepares and registers all mineral land transfers to the Crown;
- enforces foreclosures under The Mineral Taxation Act;
- interprets and verifies mineral land ownership for various branches of the department and for industry;
- provides historical reviews and data necessary for any legal cases regarding doubtful mineral ownership when the department is involved;
- registers and withdraws caveats that affect Crown mineral lands;
- registers and discharges mechanics' liens filed against Crown mineral land dispositions under The Mechanics' Lien Act.

Mineral Land Records Section

- maintains a mineral land record of all Crown and freehold mineral ownership, which includes an up-to-date record of all Crown mineral land dispositions in the surveyed area of the province;
- verifies Crown mineral lands available for Crown mineral land disposition sales;
- maintains a record of all Crown mineral lands held subject to various trust agreements. This includes the registration of transfers of the trust certificates and the availability for land disposition sales;
- computes acreage figures for all Crown mineral land dispositions;
- supplies industry upon request, information regarding the disposition or availability of Crown mineral lands;
- verifies mineral land ownership for every well that is licensed.

Landfile Section

- maintains an up-to-date computerized landfile with data identifying all completed, producing and expired oil and gas wells in the province. Ownership of each well is identified and the data is used in the collection of oil and gas revenues;
- verifies new ownership of mineral lands that relate to producing properties.

Summary of Activities

The following table indicates the number of transfers completed during the year under review.

Land Registration District	Transfers	Acreage
Regina	11	2,640
Saskatoon	1	160
Moose Jaw	3	480
Yorkton	1	160
Total	16	3,440

Mechanics' Liens

During the fiscal year 21 liens were registered and 121 discharges were recorded under The Mechanics' Lien Act.

Caveats

Nine caveats were placed against delinquent taxpayers' titles and ten caveats were withdrawn in compliance with The Mineral Taxation Act. A total of 530 caveat withdrawal notices were filed to remove encumbrances from Crown mineral titles.

Publications Office

Publications co-ordinates printing, marketing, sales and distribution of department publications, as well as the preparation of materials to support these sales. Public inquiries are also answered through the office. Additional sales of publications were generated through displays set up at two trade shows.

In early 1985 the Information Services Review was initiated to identify areas which required changes and improvements to better meet the department's goal of expanded service to industry. Activities resulting from the review's recommendations will be ongoing in 1985-86.

During the 1984-85 fiscal year, sales of publications totalled $157,333., a rise of over $27,000. from the previous year.

Energy Division

Doug Patriquin
Assistant Deputy Minister

The Energy Division conducts research and analysis of policy issues related to energy resource development. Information and recommendations are provided to government to assist in the formulation of policies in areas such as the rate of development of the province's energy resources; the pricing and taxation of energy resources; energy research, development and demonstration activities; and non-conventional and renewable energy sources. The division also carries out negotiations which relate to the National Energy Program with the federal government and other provincial governments.

Policy Analysis Branch

The Policy Analysis Branch, formerly the Energy Policy Branch, was restructured in 1984 to include policy analysis responsibilities for the mineral sector of Saskatchewan, as well as the energy sector. The purpose of the change is to allow for the same economic and policy analysis to be conducted for all sectors under the department's regulatory mandate, namely potash, uranium, oil, natural gas and coal.

The branch has four main functions:

- to monitor and assess the fluctuations in the external environment in which the industry operates, and to co-ordinate the department's economic and revenue forecasts;
- to conduct economic and financial evaluations of projects and policies relating to the production, processing, distribution, marketing, pricing and taxation of the mineral and energy sectors;
- to develop and recommend policy and strategic options and instruments for the mineral and energy sectors;
- to participate in federal/provincial negotiations on issues of joint interest in the mineral and energy sectors.

To fulfill these responsibilities, the professional backgrounds of personnel in the branch provide a range of skills which enhance its ability to evaluate, co-ordinate and initiate issues or policies. Close liaison with both the industry and the other branches of the department ensure that the policies developed are timely, effective and sustainable.

Oil

In 1984, the branch's primary oil-related activity was its participation together with the Petroleum and Natural Gas Division of the department, in the discussions with the federal government, the governments of other producing provinces, and the representatives of industry, that led to the Western Accord Agreement. The branch's role was to research and formulate recommendations on the pricing and taxation issues under negotiations recognizing the unique features of Saskatchewan's oil industry. The outcome of the negotiations are as follows:

- deregulation of oil prices and volumes effective June 1, 1985;
- a new fiscal regime for oil, including the phasing out of the Petroleum and Natural Gas Revenue Tax (PGRT) and the Petroleum Incentive Program (PIP), and the elimination of PGRT on any new oil produced in the province;
- a commitment to negotiate a "market-sensitive" gas policy with the industry, the federal government and provincial governments (both producing and consuming) by November 1, 1985.

In addition to special responsibilities that arise such as those related to the Western Accord, the branch has on-going duties, such as monitoring fluctuations in world prices and assessing the impact on the Saskatchewan industry. This will be of particular importance in the years ahead with deregulated prices and markets. Since the proposed upgraders are highly dependent upon the price differential between heavy and light crudes, these components are closely monitored by the branch.

To measure the impact of government fiscal changes a supply model of drilling activity and crude oil production was developed in 1984. Further refinement of this model will continue. To enable a more accurate calculation of the direct impact of energy policy changes on employment in Saskatchewan, an employment survey was undertaken and a model was developed.

Looking ahead, one issue of concern to the oil industry is the future supply of diluent required to facilitate the transportation of heavy oil to export markets. The branch has completed a separate study of future and supply and demand to help clarify the issue, and the industry, cognizant of the problem, has responded with research of its own.

Natural Gas

The Policy Analysis Branch has had a significant role in assessing the benefits the natural gas industry has derived from the natural gas policy initiatives instituted in 1983-84. Part of the new policy included a negotiated backout from Alberta contracts, and increases in fieldgate prices and gas producer netbacks, which were each designed to stimulate gas exploration, development and production. The initial goal was to double production from approximately 35 bcf in 1982-83 to 70 bcf by 1987-88. The policy was designed specifically to encourage the discovery of new reserves and to "prove-up" existing ones, so that provincial self-sufficiency could be achieved by 1990.

To this end, the policy has been successful as indicated in the following figures:

- number of gas wells drilled in 1984 rose to over 440 compared to 186 in 1983 and 13 in 1982;

- total gas production in the province has risen from 35 bcf in 1982 to 44 bcf in 1984, which now represents 43.4 percent of Saskatchewan's total gas requirement;
- sale of leases for gas-prone areas in 1984 reached $10.89 million compared to $5.22 million in 1983.

The branch has also continued to evaluate the price and royalty structure in the province, with a view to instituting improvements that will sustain and enhance growth of the industry, and further stimulate provincial production toward self-sufficiency. Models for a new product-sensitive royalty to be applied to new gas developments have been credited and analyzed in consultation with industry representatives, and a new royalty has been targetted to be implemented by the summer of 1985. As well, branch staff will be evaluating possibilities of creating increased market opportunities for Saskatchewan gas both within the province and external markets. The branch will also participate in negotiations with the industry and with the federal government in talks leading up to the national deregulation of gas prices, scheduled to take place on November 1, 1985.

Coal

The role of the branch with respect to the coal industry in Saskatchewan includes a number of continuing responsibilities: assessment of tax and royalty schemes that could be levied on coal production; production of coal supply, demand and revenue forecasts; and preparation of coal-related briefing material.

During 1984-85, branch staff continued a review of the coal lease disposition policy by examining alternative lease disposition schemes, with the objective of increasing the security of tenure of leaseholders and simplifying the regulatory framework in which leaseholders must operate. An extensive examination of coal marketing possibilities continued. Branch staff also initiated discussions with industry to work towards identifying an active role for the government in enhancing the marketability of coal.

Uranium

The branch, provides an analysis of taxes and royalties levied on uranium production in the province from both an economic and financial perspective. Uranium supply and demand issues are reviewed from an economic perspective in conjunction with the Mineral Policy and Statistics Branch, and briefing material on uranium-related issues is prepared.

The branch participated in an ongoing review of the uranium royalty system with the Geology and Mines Division which included the examination of alternative royalty systems. As well, a full-time position was staffed near the end of the fiscal year to assist in a strategic assessment of Saskatchewan's position as a supplier to the world market. Included in the topics to be reviewed is the long-run world supply/demand situation, and the impact of the balance or inbalances between supply/demand on prices, production levels and the pace of future development.

Potash

The branch hired a full-time potash analyst near the end of fiscal year 1984-85 and embarked on a study of the issues and opportunities facing the province's potash industry. Among other topics, the study includes an analysis of the factors influencing potash demand in the U.S., which is Saskatchewan's most important market for potash. As part of its mandate in potash, the branch is paying particular attention to how Saskatchewan can develop markets for potash in China, India, Indonesia and other countries whose potash consumption is expected to grow rapidly. As well, the branch assisted the Mineral Policy and Statistics Branch of the Geology and Mines Division in its review and modification of the Potash Resource Payments Agreements.

Regulatory and Legislative Reform

In an effort to streamline government regulations and legislation relating to the non-renewable resource sector, the Policy Analysis Branch has continued to contribute to the reformation programs initiated in 1983. Efforts in 1984-85, were focussed on seven separate projects:

- new Oil and Gas Conservation regulations to modernize drilling and production conservation practices in the province;
- new Crown Minerals Act introducing a unified code of laws for the disposition of mineral rights by the provincial Crown;
- new Mineral Resources Act, 1985 replacing the obsolete administrative elements of the existing one and entrenching new constitutional powers to the province;
- new Geophysical Exploration regulations, modernizing the seismic survey laws in the province;
- and three new sets of disposition regulations, one each for oil and gas, coal and minerals.

Of these projects, the new legislation is scheduled to be enacted in the spring of 1985; the Oil and Gas Conservation regulations and the Geophysical Exploration regulations came into force in February, 1985; the Disposition regulations are scheduled to be finalized by the end of 1985.

Energy Technology Branch

The Energy Technology Branch is responsible for co-ordinating and promoting the development of innovative energy technologies required in Saskatchewan. As producers and exporters of energy, we will benefit from finding better ways to recover and utilize our vast energy resources like heavy oil and lignite coal. The fuller use of these resources would help meet the energy demand of ourselves and other Canadians while bringing economic benefits to th province.

To accomplish its purpose the branch:

- puts in place and delivers funding programs to support energy research, development and demonstration (r,d&d) projects;
- co-ordinates energy r,d&d activities in Saskatchewan wherever there is provincial government involvement;
- monitors energy r,d&d activities in Saskatchewan, Canada and internationally;
- liaises with other governments; provincial, federal and foreign to exchange project information and ideas, and to explore possible co-operative research efforts.

The Energy Technology Branch is also responsible for any alternative energy and energy conservation issues referred to the department.

In order to carry out its responsibilities, the branch administers the following program:

The Heavy Oil/Fossil Fuels Research, Development and Demonstration Program

This program is intended to encourage research, development, and demonstration of new technologies that facilitate the expanded production and use of Saskatchewan's fossil fuel resources. The program places particular emphasis on heavy oil, with lesser, but still significant emphasis on the enhanced recovery of light and medium oils, and on lignite coal.

Saskatchewan's large reserves of heavy oil and lignite coal have the potential to contribute significantly to Canada's energy supply and to Saskatchewan's economic development. However, technical barriers hinder the expanded production and fuller utilization of these resources.

The high density and high viscosity of heavy oil combined with the thin, unconsolidated sandstone reservoirs in which it is found make it difficult to produce. Only 5 percent of the heavy oil-in-place can be produced by primary recovery techniques. As well, heavy oil is difficult to transport and needs to be upgraded to increase its utilization.

Lignite is a low quality coal. Its high moisture and high ash content and hence low energy content limit its utilization and its economic transportation range.

The governments of Saskatchewan and Canada established the Heavy Oil/Fossil Fuels R,D&D Program to help remove the technical barriers to the expanded production and use of these resources. The Heavy Oil/ Fossil Fuels Program is being implemented under two federal-provincial agreements:

- The Canada-Saskatchewan Heavy Oil Agreement, signed in 1976, and
- The Canada-Saskatchewan Heavy Oil/Fossil Fuels Agreement, signed in 1983.

As of March 31, 1985, these two agreements will make available a total of $29.2 million until March 31, 1988 for the funding of projects approved under the terms of the program.

In 1984-85 the Heavy Oil/Fossil Fuels R,D&D Program provided over $3.4 million in funding to twenty-one projects including:

- **Evaluation of Transportation Options for Heavy Oil in Saskatchewan**
  The current method of transporting heavy oil is dependent upon the availability of condensate which is used as a diluent to lower the viscosity of the heavy oil so that it may be pipelined. This project has studied various transportation options for heavy oil and will be investigating the pipelining of several oil-in-water emulsions.
- **Improved Oil Recovery — Dodsland Viking Field**
  The project involves field pilot testing to determine the potential improved recovery from the Viking sand reservoirs in the Dodsland area using a novel waterflood scheme. If successful, commercial application of the technology is expected to begin in late 1985.
- **Pyrolysis, Oxidation, Desulfurization and Hydrocracking of Saskatchewan Heavy Oils**
  Many processes for the recovery of heavy oil involve heating the formation rock to reduce the viscosity of the oil. The heat and gases generated by such thermal processes create a large number of chemical reactions in the oil including thermolysis, low temperature oxidation, cracking, combustion, hydrocracking, coking and desulfurization reactions. This project will investigate these chemical reactions and the factors which influence these chemical reactions in order to provide a better understanding of the reactions taking place during thermal recovery.
- **High Pressure Miscible Displacement of Saskatchewan's Southeast Oil Reservoirs**
  Primary and secondary oil production methods only recover about 25 percent of the light and medium oil in a reservoir, the remaining 75 percent of the oil remains in the ground. It is thought that the application of enhanced oil recovery techniques to Saskatchewan's light and medium oil reservoirs could succeed in recovering between 45 percent and 75 percent of the oil in such reservoirs. This project will evaluate the merits of using carbon dioxide as an enhanced recovery agent in a selected Saskatchewan light oil reservoir.

- **Evaluation of Upgrading Characteristics of Saskatchewan EOR Feedstocks**
  There is a wide variation in the characteristics of Saskatchewan heavy oil, depending on the location from which the oil was produced and depending upon the type of enhanced oil recovery technique employed to produce the heavy oil. This variation in the characteristics of heavy oil can affect the operation of a heavy oil upgrader. During this project, autoclave tests are being conducted on selected Saskatchewan crudes to determine the effect that they would have on the operation of an upgrader. Tests are also being conducted to determine safe operating ranges for Saskatchewan feedstocks with various catalysts.

Other projects which received funding in 1984-85 under the terms of the Heavy Oil/Fossil Fuels, R,D&D Programs are:

- Thermal Studies of Saskatchewan Heavy Oil Core Samples.
- Combustion Tube Studies of Saskatchewan Core Samples.
- Enhanced Heavy Oil Recovery by Carbon Dioxide Injection.
- Enhanced Oil Recovery by Steam Injection.
- Tertiary Recovery and General Reservoir Data Base.
- Reservoir Simulation Strategy for Saskatchewan.
- Reservoir Fluid Characterization and Data Base Establishment for Saskatchewan.
- Sand Control Studies.
- Field Study on Characterization and Resolution of Saskatchewan Heavy Oil Emulsions.
- Determination of Acid Numbers and Desalting of Heavy Oil Feedstocks from Field Projects.
- Fluid Catalytic Cracking of Gas Oil Fractions from Upgraded Heavy Crude.
- Coal Liquefaction Study.
- Numerical Simulation in Reservoir Engineering.
- Heavy Oil Pump Program.
- Studies of Factors Affecting the Formation of Microemulsions from Saskatchewan Heavy Oil.
- Lloydminster Area Processing Study.

Further information is available from the Energy Technology Branch regarding the projects funded under the Heavy Oil/Fossil Fuels, R,D&D Program.

Geology and Mines Division

Les Beck
Executive Director

The division is responsible for all geoscientific studies by the department, storage and synthesis of exploration data submitted by the mineral and petroleum industries and disposition of all Crown Minerals other than petroleum, natural gas, helium and oil shales. In addition, the division undertakes mineral policy development, management of the mineral taxation systems and compilation of mineral production statistics.

Geological Survey Branch

The role of the Geological Survey is geoscientific, regulatory and custodial; and is carried out against the background of the metallic, industrial mineral and petroleum exploration activity in the province. All of these industries, in one or other of their aspects, were on the rise during the year. This is reflected in the work of the Geological Survey by the rising indices of services rendered.

By nature of the geology of the province, the geoscientific program is divided between the northern and southern regions of Saskatchewan. That north of a line linking La Loche, La Ronge and Creighton is characterized by Precambrian igneous, metamorphic and sedimentary rocks that are host to the metallic mineral deposits, such as uranium, gold, copper and zinc. The Geological Survey through the Precambrian Geology and Mineral Development Sections conducts field investigations of these rock and mineral deposits in order to provide the regional framework against which mining company decisions can be made for exploration and development.

The region to the south is made up of the Phanerozoic sedimentary rocks which contain the petroleum, natural gas, potash, coal, sodium sulphate and clay resources of the province. These strata are mapped and studied by the Petroleum Geology and the Geodata-Industrial Mineral Sections for reasons similar to those in the north.

Regulatory duties of the Geological Survey are performed under the requirements for the submission of bore hole cores, samples, geophysical logs and map data by the industry in the south; and in the north by monitoring of exploration programs. These duties are carried out by the Geodata Section and the Subsurface Geological Laboratory on the one hand, and on the other by the resident geologists at La Ronge and Creighton. Custodial services are also rendered by requirement of the regulations, as well as, by the needs of the geoscientific programs. These include the maintenance of data libraries arising from drilling activities, geophysical exploration and mineral work assessment on permits and claims under the Oil and Gas Conservation Regulations, the Oil and Gas Conservation Regulations, the Oil and Gas Disposition Regulations and the Mineral Disposition Regulations, respectively. Likewise geophysical exploration activity is licensed and monitored under the Sedimentary Basin Geophysical Exploration Regulations, 1985.

The Geological Survey also provides a forum for dialogue with industry on the mineral resources of the province by sponsoring symposia through the Saskatchewan Geological Society, by presenting an Annual Open House, by formal liaison meetings with counterparts in the other provinces and federal government, through the Committee of Provincial Geologists and the National Geological Surveys Committee, and through individual consultation. Open House 1983 was attended by 200 people, mostly from the metallic mineral industry.

The Saskatchewan Geological Society Symposium "Oil and Gas Fields in Saskatchewan - 1984" was attended by some 300. Individual consultation on non-regulatory resource matters exceeded 350.

The Canada-Saskatchewan Mineral Development Subsidiary Agreement under the Economic and Regional Development Agreement was implemented on May 16, 1984. It provides for a 5-year, 50-50 parallel delivery program, totalling $6,380,000, on mineral prospecting studies in the Precambrian Shield of northern Saskatchewan and on industrial minerals in the sedimentary strata of southern Saskatchewan. Program delivery is shared with Canada Energy, Mines and Resources, under a joint federal-provincial management committee.

Precambrian Geology Section

The Precambrian Geology Section maintains a regional geoscience inventory of the northern part of the province, as an information resource and stimulus for the mineral exploration industry, as well as for other developmental and environmental projects. Reports and maps are issued based upon staff field projects. Other activities include the production of compilation reports and maps, and the maintenance of a number of data files, including geochemical, rock and mineral samples, literature collections and bibliographies. During the past year some of the data files have been upgraded, and a number of coloured 1:250,000 scale bedrock geological maps have been published. The section also provides for geoscience data processing and programming.

Projects were largely funded under the Canada-Saskatchewan Mineral Development Subsidiary Agreement. This agreement provides for a geoscience program which is expected to continue until 1989. The major part of this program concentrates on projects designed to stimulate and assist the mineral industry in exploration for gold and other precious metals in northern Saskatchewan, as well as augment and update the geoscience inventory of the province.

A number of projects (Figure 1) ranging from 1:20,000 scale mapping in belts of perceived high gold potential, to detailed mineral deposit and geochemical studies were carried out in the "gold belt" between La Ronge, Reindeer Lake and Flin Flon. Two field parties mapped about 350 km2 in the Central La Ronge Metavolcanic Belt, providing a better basis for geological and metallogenic modelling by industry in what is currently regarded as the most promising gold exploration terrain in province. This work was supplemented by geochemical studies contracted to the University of Regina.

Field studies were concluded in connection with a review of the geology and mineralization features in the Beaverlodge (Uranium City) area. Other specialized studies contributing to knowledge and understanding of the gold belts were also contracted to the University of Regina (Flin Flon/Hanson Lake geochemistry), University of Saskatchewan (Martin Sedimentology project), and Carleton University (geochronological determinations). A joint geochronological study was also continued with the University of Kansas. This consisted mainly of sampling the La Ronge Belt.

Exploration for metallic deposits by the sampling and analysis of plant material has been pursued with some success on an experimental basis by the Geological Survey in the delineation of uranium trace anomalies. The technique makes use of the uptake of metallic elements by plants from the surrounding soil. This year an expanded project under the Mineral Development Agreement was applied to gold in the Sulphide Lake region north of La Ronge.

The section also maintained its ongoing production of the 1:250,000 scale series of regional geological maps, compiled as a synthesis of earlier maps and studies of localities by various workers.

Mineral Development Section

The section was newly formed in 1984 from the Economic Geology Section and the Precambrian Records Unit of the Geodata Section. It is responsible for maintenance of the mineral exploration assessment files and the Saskatchewan Mineral Deposits Index, for evaluation and geological studies of metallic mineral deposits of northern Saskatchewan and for programs run through the offices of the resident geologists in La Ronge and Creighton.

A total of 321 mineral exploration assessment files submitted under the Mineral Disposition Regulations were processed, 85 visitors received and 86 requests for information handled. Two indexes to assessment files, for the Southern and Athabasca Mining Districts respectively, were published.

Work continued on the Saskatchewan Mineral Deposits Index with documentation of new occurrences and updating. The index provides a primary reference for mineral exploration and land use planning. At year end a report designed as a users guide to the index was in preparation. Seventeen major requests for index data were handled.

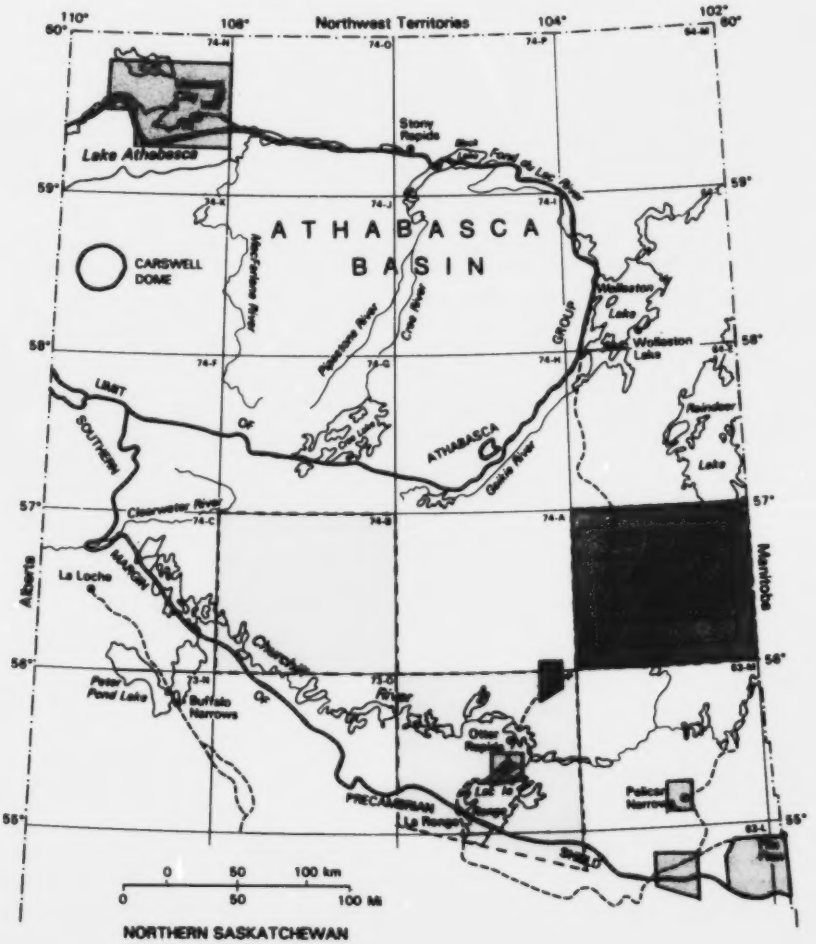
Studies of gold deposits were undertaken as part of the Geoscience Program under the Mineral Development Agreement. These were in the Goldfields area south of Uranium City, at Sulphide Lake near La Ronge and at the Rio Zone gold deposit in the Flin Flon area, and involved detailed geological mapping of deposits and their surroundings, together with mineral and geochemical investigations. The work at the Rio Zone was instrumental in providing guidelines to ore controls within this deposit, which has experienced development problems.

Collection of mineralized core undertaken through the office of the resident geologist in La Ronge continued with additions from the Deilmann orebody at Key Lake, from several gold prospects in the La Ronge Belt and from gold and base metal properties in the Flin Flon area. A new index to the collection was completed and released as an open file report.

The first of a new series of 1:250,000 scale metallogenic maps was published and work continued to further develop this series. These maps provide details of location, metal association, development status and type of mineralization, as well as reference to information on all noted mineral occurrences. They will augment a similar scale compilation bedrock geology series and provide a valuable reference to the mineral exploration industry.

The resident geologists, through offices in La Ronge and Creighton monitor the mineral exploration industry in northern Saskatchewan and also service it by providing up-to-date information on exploration and mining activities and opportunities. The offices maintain files of current mineral claim maps, air photos, geological maps and reports and assessment work submissions for their respective districts.

Figure 1
Precambrian Mapping Projects


Northwest Territories
Lake Athabasca
ATHABASCA
BASIN
CARSWELL
DOME
Alberta
Manitoba
La Loche
Buffalo
Narrows
Peter
Pond Lake
Otter
Rapids
Pelican
Narrows
Wollaston
Lake
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Petroleum Geology Section

To redress what had become a critical deficiency of standardized subsurface geological data arising from the intense petroleum and natural gas exploration, the traditional role of the former Sedimentary Research Geology Section was suspended. The data synthesizing role of the Geodata Section was transferred to a newly organized Petroleum Geology Section as a primary function. Smaller and more narrowly focussed studies on hydrocarbon related topics would also be conducted as resources permitted.

Priority was given to picking well logs in order to clear up a backlog from previous years. This objective was achieved; a total of 6,011 logs being picked.

Four cross-sections were constructed, suitable for distribution as blue-lines copies. These are part of an ongoing series intended eventually to cover the southern half of the province, to tie into neighbouring provinces and to standarize and speed up log-picking.

One geological project, "The Sedimentology of the Mannville Group (Lower Cretaceous) in the Tangleflags Area, West Central Saskatchewan", has reached the editing stage. A new geological project was begun: "Inventory of heavy oil in place and enhanced oil recovery potential in central western Saskatchewan".

The catalogue of thin sections stored with the Petroleum Geology Section was completed and lists 1,476 thin sections. The catalogue will be updated as necessary. A rock specimen set, consisting of some twenty-five different rocks and minerals from Saskatchewan, was produced as an educational offering.

Consultations by industry, university and other government personnel continued at a high rate throughout the year. Consultative support was given to several graduate students doing theses on subsurface topics.

Geodata and Industrial Minerals Section

The Well Records and Geophysical units of the Geodata Section of the previous year were combined with the Industrial Minerals Section, in keeping with staff consolidation under budgetary retrenchment.

Industrial Minerals Unit

The unit assumed co-secretarial duties of the Federal-Provincial Mineral Development Agreement. It also planned industrial mineral-related programs to be conducted in the geoscience sector, and provided technical consultation to the federal counterpart of the agreement in planning industrial mineral projects under the mineral technology and development studies sectors.

In-house projects included:

- preliminary field work on the potential for building stone quarries along the Hanson Lake Road.
- air photo interpretation of peatland resources of the Pasquia Hills region. This work was preliminary to a peatland inventory of the area which was suspended by a termination of funding.
- wind-up of the Buffalo Narrows Fuel Peat Demonstration Project for which funding was also cut.
- commencement of a comprehensive paper on the industrial minerals of Saskatchewan.

Several technical papers by the industrial minerals staff were prepared or are in an advanced stage of preparation. These include:

- Industrial Minerals of the Western Canada Sedimentary Basin submitted as part of the Canadian contribution to a major joint Canada - United States overview on the geology of North America.
- Peat Resources in Saskatchewan (in press), based on field reconnaissance surveys in the western peat belt from 1979-81.
- Petrology of Potash-Bearing Members of the Middle Devonian Prairie Evaporite, Saskatchewan (in preparation), based on approximately two years of intermittent work on potash cores and mine samples.
- Magnesium salt (Carnallite) in the Potash Members of the Middle Devonian Prairie Formation in Saskatchewan, presented at the 87th annual general meeting of The Canadian Institute of Mining and Metallurgy, Vancouver.

The section handled approximately 160 technical enquiries related to industrial mineral resources in the province. This represents a 25 percent increase over 1983-84. The variety is diverse and most of the enquiries originate from industry. Figure 2 illustrates the distribution of enquiries.

The section continues to be involved in the review of technical data submitted by industry and arising from exploration for industrial minerals and proposals for development.

Well Records Unit

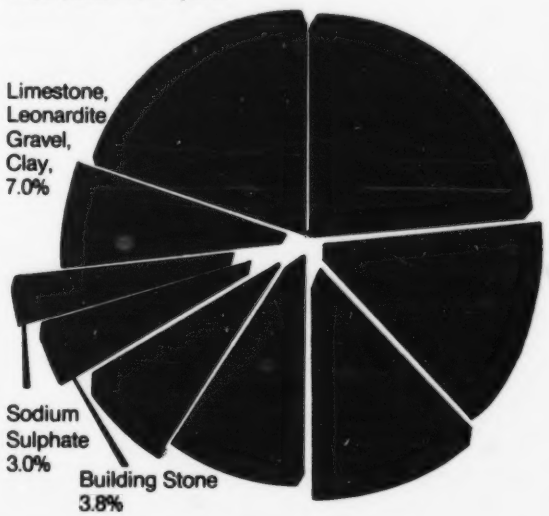
The unit experienced a record-breaking year in practically all areas of activity. During the fiscal year, 3,213 new well files were created and over 1,600 new wells were added to the computerized well information system.

Steps were taken late in the year to increase well data coding capacity. As a result data from over 2,400 new wells was coded and nearly 2,700 well files were amended by the addition of supplementary data or correction of original data.

Demand for information services increased substantially during the period. The staff pulled and refiled the records of 30,439 wells; provided industry with over 55,000 pages of photocopied data and conducted 24 computerized data searches. Over 16,000 submissions of technical data were processed and nearly 1,300 letters requesting overdue information of delinquent companies were mailed.

The unit participated in planning for a conversion to a new computerized data system, which will provide direct on-line input and greater versatility in data access.

Figure 2
Distribution of Enquiries



Geophysical Unit

Geophysical activity in oil and gas exploration increased markedly in Saskatchewan. However, unlike the previous year, the activity has spread more or less evenly across the province, rather than centred at a few areas. The overall result is a considerable increase of work for the Geophysical Unit, mostly in the form of consultation, advice, guidance and dissemination of geophysical information and data to the oil companies.

The following projects were undertaken:

- New Geophysical Exploration Regulations that are more compatible with current trends and techniques of geophysical exploration were introduced.
- The available geophysical data/information for southern Saskatchewan, as far north as Latitude 56° N (north of Lloydminster) was revised and updated.
- Discussions were conducted with industry and new procedures were established for the rapid processing of geophysical information/data to be supplied to oil companies for the petroleum land sales. Likewise through numerous discussions, meetings and correspondence between the Geophysical Unit, industry, rural municipalities and the public, a liaison was established to set up new guidelines for the conduct of geophysical operations on public and private land in Saskatchewan, so that these operations run more smoothly in the province.
- Discussions were conducted with officials of the Federal Petroleum Incentives programs for the administration of these programs in Saskatchewan.

Administration of the Geophysical Exploration Regulations and Petroleum and Natural Gas Regulations was carried out without major problems. Revision and updating of the geophysical maps are being conducted as an ongoing project. Many meetings were held with the exploration industry on potential oil and gas resource areas in Saskatchewan.

The following activities are on record:

Licenses issued	80
Crew certificates issued	208
Permits issued	127
Monthly reports received	600
Seismic location maps	300
Petroleum Incentives processed	400
Copies of geophysical maps sold	2,643

Subsurface Geological Laboratory Unit

During the year 1984-85, the laboratory recorded the following activities:

New core received: 12,028 boxes from 798 wells.

Core now in storage: 242,926 boxes.

Drill cutting samples washed, catalogued and stored: 29,055 vials.

Drill cutting samples, washed and catalogued for shipment to the Department of Energy, Mines and Resources, Calgary: 24,439 vials.

Actual samples shipped: 16,590.

Number of industry users of the laboratory: 175 from 116 firms.

Cores examined: 53,265 boxes from 3,824 wells.

Samples examined: 306 wells.

Temporary transfers of cores to outside the province: 32 wells

Thin sections prepared for staff: 1,590

The general public, in particular elementary school teachers and their earth science classes, continued to show interest in laboratory building tours. Several such tours, finishing with a brief talk and question period, were conducted during the year. The core examination facilities were also utilized by university students in conjunction with geological course work and theses.

Editorial and Cartographic Unit

The unit was formed as part of the reorganization in which half of the Drafting Section was transferred to the Geology and Mines Division from the Finance and Administration Division. It is responsible for the editing and production of all geoscientific reports and maps published by the branch. Special projects include graphics for conference displays, text figures for magazine articles and papers in scientific journals, and slides for conference presentations.

During the fiscal year, the unit produced 33 publications comprising 1,232 pages and 44 maps. These figures represent an increase of approximately 10 percent over the previous fiscal year despite a reduction in the number of drafting staff due to layoffs. Approximately 20 percent of staff time was spent on special projects.

Publications

Reports

Schreiner, B. T. (1984): Quaternary geology of the Precambrian Shield, Saskatchewan; Saskatchewan Energy and Mines, Report 221, 109p.

Johnston, W.G.Q. and Thomas, M.W. (1984): Compilation bedrock geology, Reindeer Lake South, NTS area 64D; Saskatchewan Energy and Mines, Report 230 (1:250,000 scale map with marginal notes).

MacDougall, D.G. (1984): Metallogenic compilation, Reindeer Lake North, NTS area 64E: Saskatchewan Energy and Mines, Report 239, 11p (includes 1:250,000 scale map).

MacDonald, R. et al., eds. (1984): Summary of Investigations 1984, Saskatchewan Geological Survey; Saskatchewan Energy and Mines, Miscellaneous Report 84-4, 144p.

Fuzesy, A. (1984): Index to assessment work in the Southern Mining District of Saskatchewan; Saskatchewan Energy and Mines, Miscellaneous Report 84-6, 26p.

Fuzesy, A. (1984): Index to assessment work in the Athabasca Mining District of Saskatchewan; Saskatchewan Energy and Mines, Miscellaneous Report 84-8, 98p (supplement to Miscellaneous Report 79-5).

Open Files and Data Files

Coombe, W. (1984): Gold in Saskatchewan; Saskatchewan Energy and Mines, Open File Report 84-1, 134p.

Schreiner, B.T., Alley, D.W. and McNamara, S.J. (1984): Quaternary geology of the Precambrian Shield, Saskatchewan; Saskatchewan Energy and Mines, Open File Reports 84-2 to -21 (1:250,000 scale maps with marginal notes).

Parslow, G.R. and Gaskarth, J.W. (1984): Geochemistry of the East Amisk area; Saskatchewan Energy and Mines, Open File Report 84-23, 156p.

Johnston, W.G.Q. (1984): Geology of the Wathaman Lake (East) area; Saskatchewan Energy and Mines, Open File Report 85-1, 65p.

Gracie, A.J. and Gray, L.J. (1984): Index to La Ronge core collection; Saskatchewan Energy and Mines, Open File Report 85-3, 145p.

Lee, N. (1984): Index to POD File; Saskatchewan Energy and Mines, Data File 5.

Thomas, M.W. and Slimmon, W.L. (1984): Reindeer Lake South geological bibliography; Saskatchewan Energy and Mines, Data File 6.

Mines Branch

This branch is responsible for the disposition, development and conservation of all Crown minerals with the exception of petroleum, natural gas, helium and oil shale. The activities of the branch are carried out through the Mining Lands Section and the Mining Operations Section.

Mining Lands Section

Mining Lands is responsible for the administration and disposal of Crown minerals under the following regulations:

- The Mineral Disposition Regulations, 1961 (uranium, base and precious metals);
- The Quarrying Regulations, 1957 (sand, gravel, clay, bentonite and other quarriable substances);
- Alkali Mining Regulations (sodium sulphate);
- The Coal Mining Regulations, 1957 (coal); and
- The Subsurface Mineral Regulations, 1960 (potash, salt).

Activities of the section are centred in Regina, but a field office is also maintained in La Ronge to permit local administration of regulations.

A total of 500,137 hectares of new dispositions covering 374 mineral claims, 96 claim blocks and 6 prospecting permits were taken out under The Mineral Disposition Regulations, 1961, a decrease of about six percent from the area taken out in the previous year.

On March 31 there were 40,470 hectares held under 2,500 mineral claims; 3,159,959 hectares held under 1,084 claim blocks; 1,843,219 hectares held under 28 prospecting permits; and 822,538 hectares held under 705 leases. The total area held was 5,857,186 hectares, down about five percent from March 31, 1984.

In the year under review, 18 prospecting permits covering 12,052 hectares and 32 leases covering 201 hectares were granted under The Quarrying Regulations, 1957. Thirteen of the prospecting permits were for one or more of sand, gravel and rock and five for kaolinite. Thirty-one of the leases were granted for

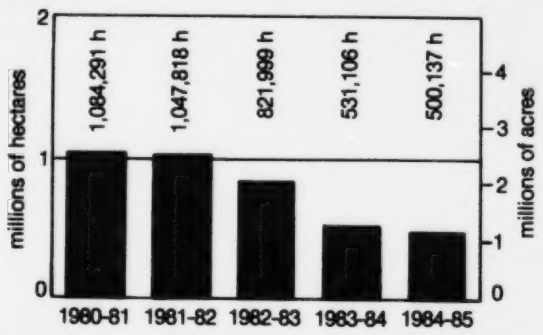
one or more of sand, gravel, rock and clay, of which one was acquired by Saskatchewan Department of Highways and Transportation, eight by rural and urban municipalities and 22 by private interests. One quarrying lease was granted for clay. At year end 11,503 hectares were held under 14 prospecting permits and 19,604 hectares were held under 1,003 quarrying leases.

No alkali mining leases were issued during the year, leaving the total alkali dispositions held on March 31 at 323 leases covering 9,777 hectares.

One coal lease was issued and 113 surrendered, resulting in a total of 98,125 hectares being held under disposition for coal on March 31, a decrease of about 19 percent from March 31, 1984.

Potash dispositions remained unchanged with nine leases and one permit totalling 203,926 hectares being held at the end of the year.

Figure 3
New Areas Acquired Under Claims, Claim Blocks and Permits



Mining Operations Section

The Mining Operations Section is responsible for administration of sections of The Mineral Disposition Regulations, 1961, governing the conduct and reporting of mineral exploration work programs and for monitoring mining activity.

Exploration Unit

The unit is responsible for evaluating technical data submitted as assessment work by the mineral industry under The Mineral Disposition Regulations, 1961.

Assessment work received during a fiscal year gives an indication of major trends in the level of mineral exploration activity and the geographic areas in which such activity has taken place, although it does not provide a true measure of total exploration expenditures. A total of 1,816 submissions covering 10 categories of exploration work were received, up about 32 percent from the previous year. Exploration expenditures claimed were up 34 percent from 1983-84 ($30.3 million vs. $22.5 million, vs. $48.2 in 1982-83). Approximately 60 percent of the total reported expenditures was for diamond drilling, and approximately 58 percent was associated with the search for uranium in the Athabasca Basin, particularly at Key Lake, Cigar Lake and Collins Bay.

Engineering Unit

The major functions of the unit are to:

- monitor development and mining operations pertaining to those minerals for which the branch has responsibility; and
- review project proposals and technical reports pertaining to mining developments referred to the department by Saskatchewan Environment as part of the environmental impact assessment process.

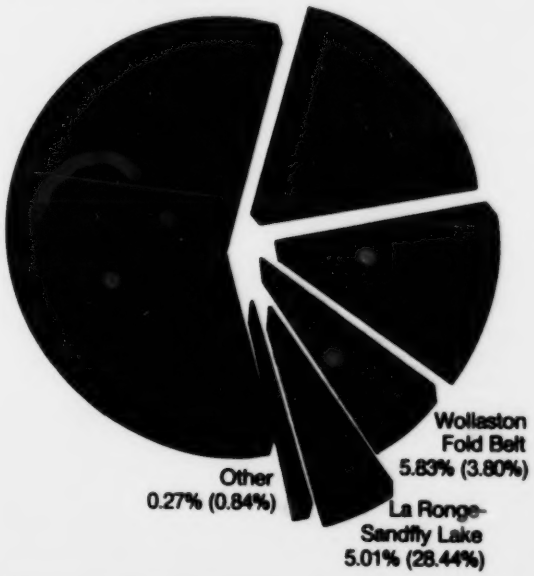
Disposition maps for internal use in monitoring mining operations were prepared for quarrying leases, coal leases, alkali leases and mineral claims held for potential placer mining operations.

Mining advance plans updated to the end of calendar year 1983 were received for five potash mines, two coal mines an five metal producing operations, and plans updated to the end of calendar year 1984 were received for five potash mines, three coal mines and one metal production operation.

Staff participated in four meetings on mining operations research related to the development of uranium, industrial minerals, coal and potash, and mining operations were studied at two potash mines.

During the year, six technical reports pertaining to mine developments were reviewed, three of which were directly associated with environmental assessments required by Saskatchewan Environment.

Figure 4
1984-85 Assessment Work Expenditure Distribution by Region
(1983-84 Comparative Distribution)



Mineral Policy and Statistics Section

The Mineral Policy and Statistics Section is responsible for the analysis of mineral issues and economic and revenue forecasting related to metallic minerals (uranium, base metals, precious metals, and other "hard rock" minerals) and industrial minerals (potash, sodium sulphate, aggregates and other quarriable commodities). The section conducts research and policy formulation to ensure the maintenance of a healthy investment climate in the province's mineral resource sector.

Specific responsibilities of the Mineral Policy and Statistics Section are to:

- monitor and evaluate the development, production, taxation and marketing of mineral resources;
- monitor and evaluate the impact of royalties and taxation on the industry and recommend policy changes when necessary;
- monitor the impact of federal policies on the provincial resource sector;
- maintain ongoing consultation with industry officials to ensure the maintenance of a healthy investment climate;
- recommend special incentives measures where appropriate and assist in their implementation;
- prepare economic and Crown revenue forecasts;
- prepares briefing materials and position papers to inform senior management of emerging issues and changes in the mineral resource sector; and
- collect and analyze statistical data on the mineral sector for research purposes and inclusion in the department's Mineral Statistics Yearbook.

Potash

Discussion with industry representatives resulted in a six month extension of the Potash Resource Payment Agreements that expired June 30, 1984. Subsequently, agreement was reached on amended agreements which will cover the period January 1, 1985 to December 31, 1986. The terms of the new agreements were largely unchanged, however, incentives were added for market development and research and development to encourage market growth, particularly in the Pacific Rim and to assist in remaining competitive.

Potash markets continued to improve during the year. However, domestic potash prices gradually softened, limiting the industry's improvement in profitability.

Staff members continued to monitor the potash market situation and conduct policy analysis on issues related to taxation and the development of the province's potash industry. Assistance was given to industry officials, departmental staff and other government agencies in the interpretation of the agreements and regulations.

Uranium

Throughout the fiscal year staff members monitored the performance of the industry and of world uranium markets. Spot market prices continued to decline and by the end of the year had reached their lowest level in real terms since they were first published in 1968. However, the strength of the United States dollar enabled Saskatchewan producers to remain profitable. Average Saskatchewan selling prices also continued to decline but still remain well above spot market levels.

Production volume more than doubled during the fiscal year as Key Lake approached design capacity and the Phase II project at Cluff Lake came onstream. In the meantime sales volumes more than tripled as significant quantities of Key Lake production began to reach the market and the former UCAN stockpile was finally depleted and current Saskatchewan production began to take its place.

Section staff continued monitoring the evolving trends in marketing activity, long term pricing and uranium royalty levels and continued the assessment of the performance of the uranium royalty regime.

Section staff maintain responsibility for the uranium public relations function which was previously handled by Executive Council.

Metallic Minerals

Section staff participated in a joint industry/ government working group to discuss changes to the Mineral Disposition Regulations, 1961. A draft copy of The Mineral Disposition Regulations, 1985 was circulated to the industry and the working group met to discuss reactions to this document, and possible amendments.

Section staff met with representatives of the newly formed Independent Mineral Developers Association to discuss the special interests and needs of junior mining companies and independent prospectors.

Section staff participated in another industry/ government working group which prepared draft amendments to the metallic mineral (excluding uranium) royalty provisions in the Mineral Disposition Regulations. These amendments were required to implement incentives introduced in the budget to help stimulate development activity in the base and precious metal sector.

Other Industrial Minerals

The section also addressed policy issues related to the development and management of other industrial minerals in the province. The major mineral in this category was sodium sulphate.

Petroleum and Natural Gas Division

Bruce Wilson
Executive Director

The Petroleum and Natural Gas Division has major responsibilities in all areas related to provincial jurisdiction over oil and gas resources including disposition and management of Crown oil and gas rights; well licensing and surveillance of all exploration, development and production operations; oil and gas conservation including determination of reserves and producibility estimates, maintenance of production and disposition statistics, crude oil marketing, and royalty and tax legislation.

The division is organized into five branches:

- Geology and Petroleum Lands
- Engineering Services
- Economic and Fiscal Anaylsis
- Petroleum Development
- Petroleum Statistics

The oil and gas industry continued to grow in terms of importance to the overall economy of the province during the past year. Investments in exploration and development grew with record numbers of wells drilled and record amounts spent on the acquisition of Crown oil and gas rights. The increases in activity have created a significant number of jobs for Saskatchewan residents involved directly with the oil and gas industry and those sectors involved in providing support services for it. The direct revenue benefits for the province, in the form of royalties and taxes, also grew with oil and gas revenues accounting for approximately one-quarter of all revenues collected in 1984-85.

The signing of the Western Accord on March 26, 1985 was without doubt a landmark event for the province and its oil and gas industry. The new federal-provincial understanding on pricing and taxation will deregulate crude oil prices and volumes June 1, 1985 and adjust taxation of the oil and gas industry such that profits rather than revenues are taxed - the manner in which all other industries are taxed. These federal changes coupled with the provincial oil and gas policies being pursued should ensure the continuation of an active and healthy industry within the province. This optimisim is tempered somewhat by the uncertainty regarding international crude oil prices. Downward pressure on prices continued to exist as a general over-supply of crude oil remained in the world.

While conventional oil development continued to flourish in the province, the importance of pursuing non-conventional development, particularly in the heavy oil areas, has been well recognized by the department. This recognition was further evidenced by the initiation in June 1984 of a joint project by Saskatchewan Energy and Mines and Saskatchewan Environment designed to establish guidelines and regulations which will optimize the economic recovery of heavy oil while minimizing the environmental implications associated with heavy oil development.

The Heavy Oil Project, as it has been called, is being undertaken on an issue specific basis with individual studies addressing each particular area. An integral part of the project has been and continues to be the on-going consultation with industry, municipalities, interest groups and relevant provincial and federal government departments. The studies are scheduled for completion by late 1985 with implementation of an overall policy and regulatory framework expected in early 1986.

Drilling Activity

Drilling activity continued to increase in 1984 in response to the province's recovery program, the favourable crude oil market situation and the natural gas market opportunities created by a backout of Alberta gas supplies. A record 2,970 oil and gas wells were drilled for an increase of 61 percent over the number drilled in 1983. Land sale interest remained high indicating that drilling activity should remain robust into the near future.

A breakdown of 1984 drilling activity is as follows: 2,176 completed oil wells, 444 completed gas wells and 350 abandoned dry holes for an overall success ratio of 88 percent. There were 3,234 drilling licenses issued in 1984 compared with 1,921 for the previous year.

Figure 5
Wells Drilled By Area

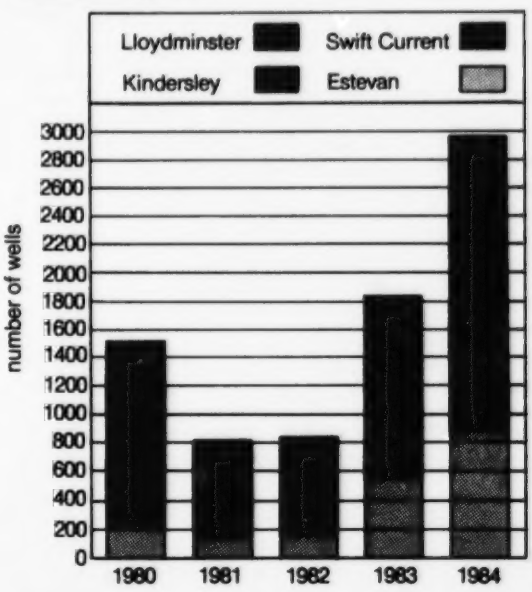


Figure 6
Total Metres Drilled By Area

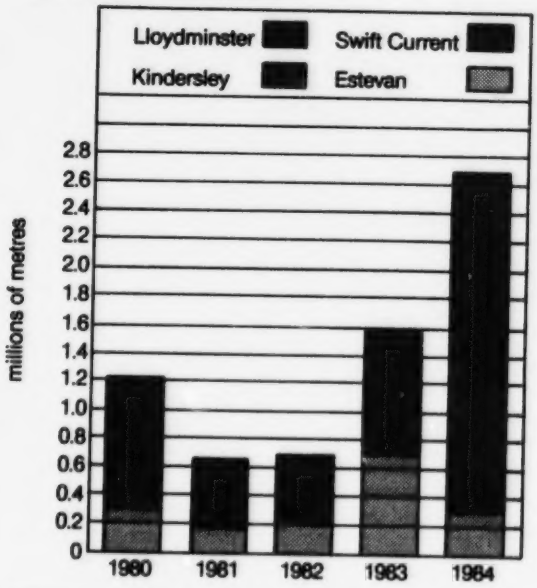
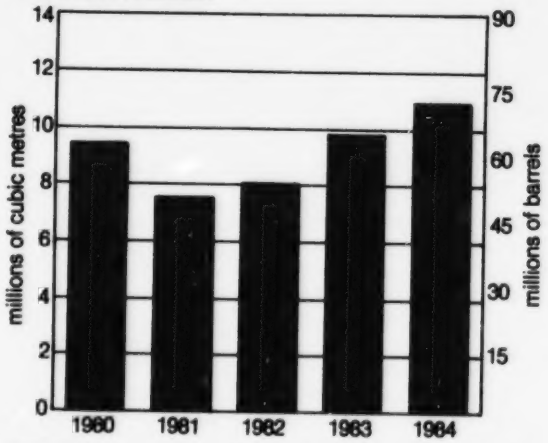


Figure 7
Crude Oil Production

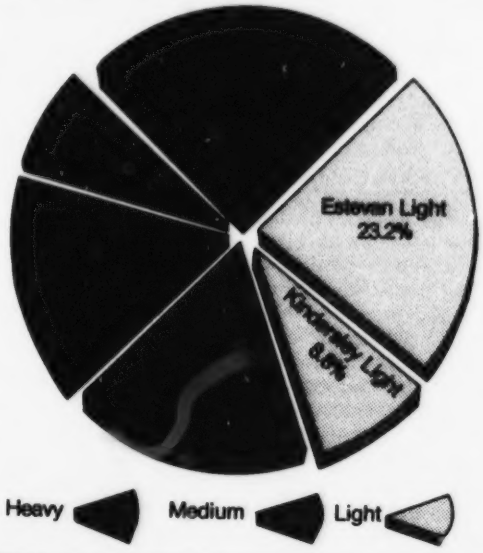


Crude Oil Production

Oil production in 1984 was 10.80 million cubic metres compared to 9.54 million cubic metres in the previous year. This 13.2 percent increase was the result of continued strong markets for Saskatchewan's crude oil and increased drilling activity. There was virtually no shut-in of production due to marketing difficulties in 1984. Some marketing problems were encountered, however, during the first quarter of 1985 when a major purchaser backed away from approximately 215,000 cubic metres of heavy and medium production destined for the U.S. northern tier market area. Marketing problems for the remainder of 1985 are anticipated to be minimal and with the high level of drilling, total production for 1985 is expected to surpass the level of 1984.

Saskatchewan's oil production is made up of different qualities of crude commonly identified as light, medium and heavy found in different geographical areas. In 1984, approximately 33.2 percent was heavy oil, 34.8 percent was medium and 32.0 percent was light.

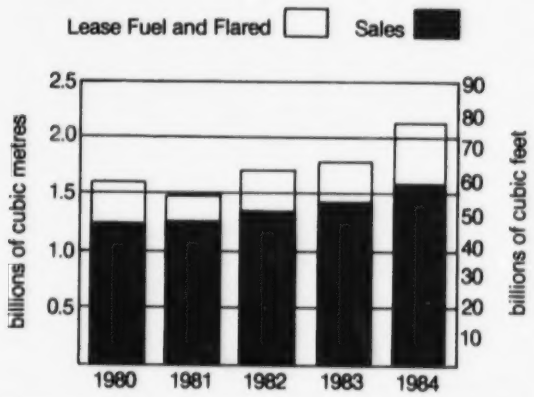
Figure 8
Quality of Saskatchewan Crude Oil Production By Area for Calendar Year 1984



Natural Gas Production

Natural gas production in 1984 was 2.13 billion cubic metres, an increase of 27.5 percent from the previous year when it was 1.67 billion cubic metres. Sales of natural gas were 1.58 billion cubic metres with the remainder of the production used for lease fuel or flared. These sales represent about 45 percent of provincial demand with the difference imported from Alberta. Natural gas production will progressively increase in the next three years because these imports will be reduced. Import reduction will allow the province's shut-in reserves to be developed and produced.

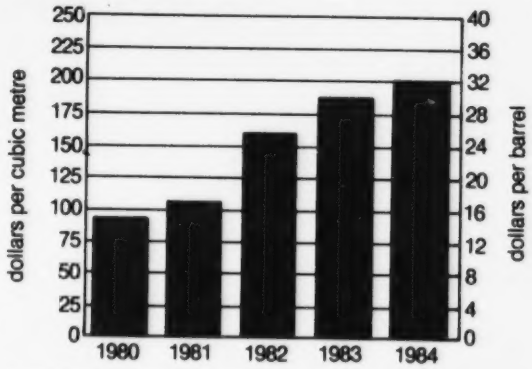
Figure 9
Natural Gas Production



Average Crude Oil Prices

The average 1984 Saskatchewan crude oil price of $201.50 per cubic metre represents an 8 percent increase above the $186.50 per cubic metre average for 1983. While old oil and new oil prices did not increase per se during the year, the increase in the average price can be attributed to the growing volume of new oil resulting from the high level of activity in the province. Approximately 62 percent of Saskatchewan's production received the equivalent of world price during the 1984 calendar year as compared to 40 percent in 1983.

Figure 10
Average Crude Oil Prices



Geology and Petroleum Lands Branch

Geology Mapping and Land Evaluation Section

This section has two principal responsibilities: geological mapping and land evaluation.

Geological Mapping Unit

Geological maps (mainly structure contour maps) are drawn and maintained for all oil and gas producing areas in the province. The maps are used for land evaluation, for reserve calculations in the Engineering Services Division, and in helping solve problems related to the producing areas. At the end of the fiscal year, 119 pool maps were being maintained. The maps may be purchased from the department's publications office.

In carrying out their mapping work geologists acquire a detailed knowledge of the geology of the producing oil and gas pools. This expertise is put to use within the Petroleum and Natural Gas Division when staff members are asked to make recommendations on submissions from industry or in dealing with other administrative matters.

Industry submissions in the reporting period included applications for pressure maintenance of producing units, conversion of wells to salt water injection and disposal, and secondary recovery of oil by waterflood. As well, requests were received for permission to drill wells outside the approved spacing pattern and for abnormal well spacing patterns.

Information and advice were made available to other branches, departments and the general public on requests ranging from the interpretation of the economic geology of known oil and gas accumulations to the hydrocarbon potential of unexplored prospects.

Land Evaluation Unit

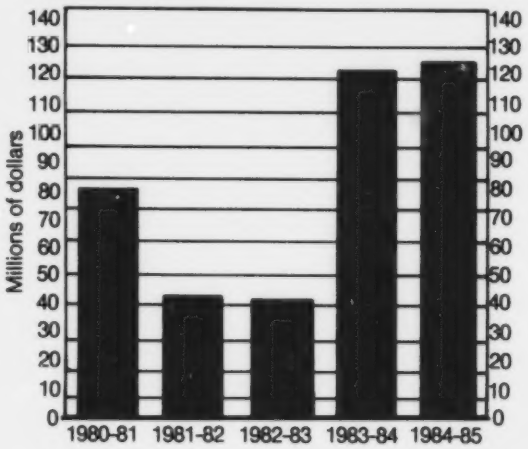
The economic potential of hydrocarbon resources underlying specific areas of the province is determined as required by the department. Monetary evaluations of reserves are primarily for land sales. As well, this unit:

- reviews and recommends requests from industry for the posting of specific Crown mineral lands at department land sales;
- prepares sales notices and technical data for sales;
- reviews and recommends acceptance or rejection of bonus bids received from industry on posted lands;
- evaluates and selects Crown acreage in drilling reservations when such reservations go to lease;
- administers net royalty leases and inspects non-unit net royalty leases and farmouts to ensure compliance with the terms or agreements made within the department;
- reviews requests for waiver of offset well commitments on leases adjoining certain freehold lands producing oil or gas and makes follow-up recommendations;
- advises industry and the general public concerning the value of mineral rights for specific areas.

Four sales of Crown petroleum and natural gas rights were held during the 1984-85 fiscal year. Revenues totalled $126,842,912.26. This is a record high for the 33 years the department has held such sales. Dispositions of mineral rights in the 1984-85 fiscal year totalled 450,673 hectares (1,113,598 acres), consisting of 36 permits containing 180,410 hectares (445,786 acres), 60 drilling reservations comprising 79,687 hectares (196,904 acres) and 1,337 leases covering of 190,577 hectares (470,909 acres).

Revenue from the sale of petroleum and natural gas rights for the past five years is shown in Figure 11.

Figure 11
Revenue from the Sales of Crown Petroleum and Natural Gas Rights



Petroleum Lands Section

This section is responsible for the administration and disposition of Crown mineral lands under The Petroleum and Natural Gas Regulations, 1969; The Helium and Associated Gases Regulations, 1964; and The Oil and Shale Regulations, 1964.

The number of petroleum and natural gas permits under disposition increased from 46 at April, 1984 to 70 at March 31, 1985 with an increase in area from 270,145 hectares (667,520 acres) to 379,567 hectares (937,896 acres). Drilling Reservations under disposition increased in the same period from 33 to 60 with an increase in area from 44,294 hectares (109,448 acres) to 79,229 hectares (195,773 acres). There were 8,621 petroleum and natural gas leases in effect which also represents an increase from 7,119 leases in effect in April, 1984. Area under lease totalled 2,400,789 hectares (5,932,270 acres).

Lands under helium disposition increased from 15,467 hectares (38,221 acres) to 21,549 hectares (53,247 acres) held under nine helium leases. Also in effect was one oil shale permit totalling 40,276 hectares (99,520 acres) and one oil shale lease totalling 1,942 hectares (4,800 acres).

Engineering Services Branch

The Engineering Services Branch evaluates Saskatchewan's crude oil and natural gas reservoirs to ensure that exploration, development and production of these resources follow good conservation and engineering standards. Sound management of these resources is essential to achieve efficient production and ensure maximum benefits from development. The mandate for these responsibilities comes from the Oil and Gas Conservation act, The Mineral Resources Act, The Pipe Lines Act and respective regulations.

Specifically this branch:

- determines crude oil and natural gas reserves for use by industry and government in planning and developing policies;
- evaluates industry applications for enhanced oil recovery projects, waste water disposal wells, off-target wells and other proposals and participates in public inquiries held to consider these applications;
- assesses unitization proposals to ensure that Crown lands receive fair and equitable unit participation;
- evaluates industry submissions for incremental oil production from waterflood and enhanced oil recovery projects to establish reductions to Crown royalties and freehold production taxes;
- establishes pool boundaries, well spacing and target areas to facilitate orderly oil and natural gas development;
- issues maximum permissive production rates for oil wells and daily allowables for gas wells, and monitors production to ensure that these rates are not exceeded;
- issues construction and operating permits for oil and natural gas pipelines and witnesses pressure tests conducted to ensure that pipelines meet operating standards;
- prepares for publication, pertinent engineering, development and production data for oil and natural gas pools, including monthly demand for Saskatchewan crude oil;
- monitors crude oil markets and tabulates nominations for crude oil;
- provides technical expertise and assistance to other branches and divisions in the department.

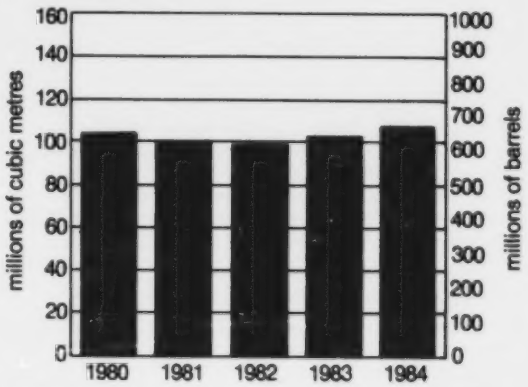
Crude Oil Reserves

Saskatchewan's remaining established crude oil reserves were increased by 5.7 million cubic metres to 107.8 million cubic metres in 1984. This is the net result of an increase in initial reserves of 16.5 million cubic metres less production of 10.8 cubic metres. This is the second year in a row where the annual reserve increases have exceeded production, largely attributed to the record exploratory and development drilling activity.

The department estimates that the potential enhanced oil recovery reserves are 667 million cubic metres with 86 percent of these reserves classified as heavy oil.

These potential reserves are an indication of the oil that can be recovered assuming that enhanced oil recovery techniques are successfully applied. Considerable technical risk currently exists requiring further research and experimentation.

Figure 12
Remaining Oil Reserves

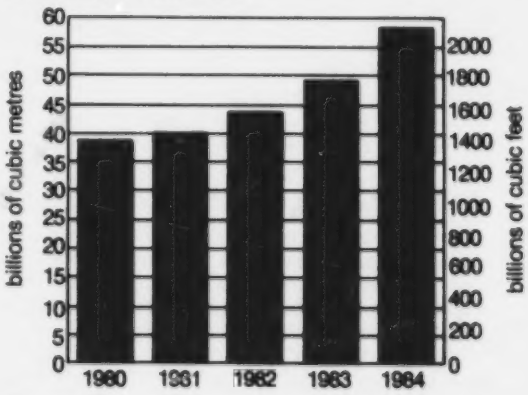


Natural Gas Reserves

Saskatchewan's remaining established natural gas reserves were increased by 9.8 billion cubic metres to 58.2 billion cubic metres in 1984. This is the net result of an increase in initial reserves of 11.4 billion cubic metres less established reserves production of 1.6 billion cubic metres.

The department estimates that the remaining ultimate potential which includes established reserves ranges between 76 and 161 billion cubic metres. Additional exploration and development is required for better evaluation.

Figure 13
Remaining Gas Reserves



Economic and Fiscal Analysis Branch

The Economic and Fiscal Analysis Branch evaluates, designs and implements oil and gas royalty/tax systems, exploration/development incentive systems and prepares oil production, revenue and expenditure forecasts. Functionally, the branch is divided into the Royalty/Tax Analysis and Incentive Administration Sections.

Royalty/Tax Analysis Section

This section analyses and designs the crude oil and gas royalty/tax structures and prepares production and revenue forecasts. Adjustments to the royalty and tax structures are made through amendments to The Petroleum and Natural Gas Regulations, 1969 and The Freehold Oil and Gas Production Tax Regulations, 1983.

More specifically, this section:

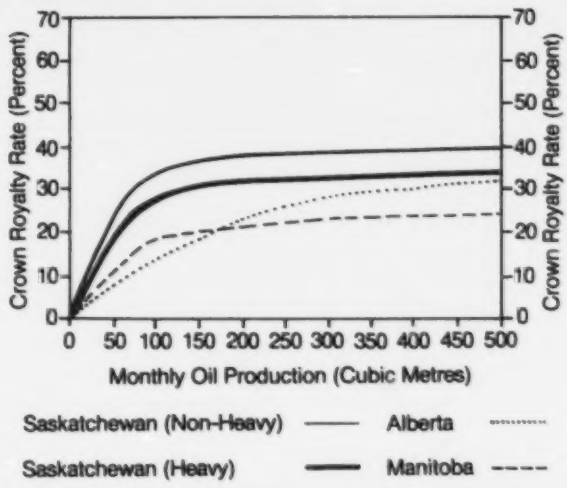
- evaluates the economics of crude oil and gas exploration, development and production under varying federal and provincial fiscal arrangements;
- analyses royalty and tax incentives to encourage exploration, development and production;
- designs provincial royalty and tax structures and related regulation amendments;
- monitors and forecasts Crown petroleum and natural gas revenues;
- monitors revenue sharing between governments and industry;
- monitors world crude oil prices and prepares forecasts of Saskatchewan crude oil prices;
- prepares submissions to boards and commissions on future crude oil supplies and demand.

The Economic and Fiscal Analysis Branch participated in the process leading up to the signing of the Western Accord on March 26, 1985. Various concepts and options were analysed by the branch to determine their impacts on industry and governments. The major features of the Western Accord included the deregulation of crude oil prices and volumes effective June 1, 1985, the elimination of the Petroleum and Gas Revenue Tax (PGRT) on new developments after March 31, 1985, the phase-out of PGRT on all remaining production by the end of 1988 and the discontinuance of the Petroleum Incentive Program (PIP) by March 31, 1986. For Saskatchewan, this agreement is expected to add stimulus to the renewal already underway in the oil and gas sector. Work was initiated on changes to administrative procedures and regulations resulting from changes announced in the agreement.

The one year royalty/tax holiday for production from new oil wells was due to expire December 31, 1985. A comprehensive review was initiated early in 1985 to determine the future of the program. This review included extensive consultation with the oil producers in the province and a detailed cost/benefit analysis of the program. The analysis continued on into the 1985/86 fiscal year with a targetted announcement date of June, 1985.

Emphasis on natural gas exploration and development in Saskatchewan has increased due to changes in the natural gas policy for the province. In 1984 the branch accepted responsibility for maintaining a full scale economic and fiscal analysis system for natural gas, much the same as now exists for oil. The Royalty/Tax Analysis Section played a major role in the design of a new gas royalty and pricing structure which is to be implemented within the 1985/86 fiscal year.

Figure 14
Conventional Crude Oil Royalty Curves
For New Developments
March 1985



Incentive Administration Section

The Incentive Administration Section is responsible for the development, analysis and administration of incentive programs offered by the province to promote increased activity. The section closely monitors the cost effectiveness of these incentive programs to ensure maximum return for the province's incentive dollar as well as a positive atmosphere for development and exploration in the province.

This section reviews all requests related to the administration of the oil royalty/tax holiday program. Under the program, non-deep development wells are eligible for one year holiday. Similarly, the incremental production from new or expanded waterflood projects is eligible for one year holiday. Exploratory and deep wells qualify for holiday periods of three to five years. During 1984, approximately 2,100 wells were eligible for the one year holiday while 145 wells were approved as exploratory and a further 20 wells were approved as either deep development or deep exploratory wells.

Economic and technical evaluations are carried out on applications under the Workover Incentive Program. Under this program the department may approve the reclassification of old oil production to new oil for royalty/tax purposes. Approval requires submission of a work program to maintain and improve production from old oil wells or units.

A three year phase-out of the Approved Expenditure Grant Program was initiated January 1, 1983. Under the terms of the phase-out, companies can recover all or a portion of the approved expenditure credits that were built up under the old grant program. Responsibilities include forecasting and determining payment requirements, and handling industry inquiries. In the 1984/85 fiscal year $22 million was paid out under this program.

The Incentive Administration Section also:

- monitors and forecasts exploration and development expenditures;
- monitors and forecasts operating costs associated with the production of crude oil;
- assists the federal Petroleum Incentives Administration with technical information on related applications;
- conducts economic analyses on special problem issues, wells and projects;
- conducts engineering evaluations related to oil and gas economics.

Petroleum Development Branch

The Petroleum Development Branch is responsible for ensuring that the field operations of the province's oil and gas industry meet acceptable technical and environmental protection standards as established under The Oil and Gas Conservation Act. The branch is supervised from Regina with field offices strategically located at Estevan, Swift Current, Kindersley and Lloydminster.

The Regina staff:

- directs field office operations;
- processes and approves applications for well drilling licenses;
- maintains records and control of well deposits made to guarantee proper drilling, completion and abandonment of wells;
- processes and approves well ownership and name changes;
- advises of offset drilling commitments on Crown land;
- processes weekly drilling reports and compiles statistical data relating to drilling activity;
- represents the department on oil spill co-operatives.

The field office staff:

- collects and compiles drilling, completion and reservoir data;
- enforces regulations, orders and policies pertaining to pollution control in the oil industry;
- checks standards, procedures and equipment used by industry in drilling, producing and abandonment of wells;
- witnesses production tests;
- performs on-site inspections of all wells and facilities;
- investigates and assists in resolving landowner problems associated with the use of land for exploration and production;
- investigates, reports and ensures that industry act promptly and efficiently in handling oil and salt water spills.

During the past fiscal year, there were 373 well ownership changes and 106 well name changes. Assignment agreements were registered and recorded in the appropriate department records for each ownership change. Offset commitments were called on 339 wells. With the increased activity, large numbers of inquiries were handled pertaining to drainage units and target areas for both oil and gas well drilling. Field office staff carried out 28,000 well, battery and rig inspections, 967 pressure maintenance/water disposal checks, 49 landowner complaint investigations, 277 gas meter inspections, 865 spill investigations, and reported on all of the drilling and completion work. During the year staff continued close monitoring of drilling mud disposal and possible gas migration problems.

Petroleum Statistics Branch

The Petroleum Statistics Branch is responsible for providing accurate statistics on all oil, gas and water production and disposition from each well in Saskatchewan as well as evaluating the wellhead price on all oil and gas. The branch is also responsible for administering two crude oil pricing programs funded by the federal government and a program for sharing the export tax revenue on crude oil exports from the

province between the Governments of Canada and Saskatchewan. Accurate and timely statistics are vital for sound resource management, policy decisions, detailed reservoir engineering studies, enforcement of good production, conservation and engineering standards, evaluation of Crown lands under disposition, and revenue auditing functions.

In particular, the branch:

- collects, validates, processes, stores and disseminates data related to production and disposition of crude oil, natural gas and water in the province.
- manages a system of computer programs which record and validate production and disposition data submitted by operators.
- implements a program to audit production and disposition data against data contained in returns submitted by purchasers, transporters, and receivers of the product of production.
- validates production and related data used by operators in calculating the amount of royalty and tax revenue accruing to the province on crude oil and natural gas production.
- conducts detailed analysis of wellhead prices of Saskatchewan crude oil and delivered price to specific markets.
- analyses, develops and administers a program for sharing the export charge revenue on crude oil exports from the province between the Governments of Canada and Saskatchewan as provided for in the National Energy Program.
- administers the New Oil Reference Price (NORP) program funded by the Government of Canada to provide world prices for conventional new oil produced in Saskatchewan beginning January 1, 1982.
- administers the Special Old Oil Price (SOOP) program funded by the Government of Canada to provide a special price equivalent to the world price for certain categories of oil discovered after 1973, but which do not receive the New Oil Reference Price beginning July 1, 1982.
- gathers and analyses statistics on the production and consumption of energy in Saskatchewan for publication in the Saskatchewan Energy Flow Accounts.
- prepares for publication the Monthly Oil and Gas Report, the Drilling Activity Report and the Mineral Statistics Yearbook.
- handles internal and external requests for crude oil, natural gas and water statistics in various formats.

Given the vital role of petroleum statistics in a dynamic oil and gas industry, the production and disposition system which records, validates and stores data submitted by over 250 operators averaging in excess of 7,000 individual reports each month on over 18,670 active oil, gas and service wells must be able to respond to a broad range of user requirements for timely and accurate statistics. During the fiscal year, the branch has evaluated and implemented a number of modifications and improvements to existing computer programs aimed at increasing system capability and efficiency to accommodate the additional needs of both external and internal users.

The wellhead price of crude oil is one of several variables in a formula used to calculate royalty and tax revenues on crude oil production. The branch continues to analyse and monitor more precisely the determination of the wellhead price for crude oil - the posted price at a field terminal less reasonable allowance for transportation from wellhead to the point of sale. This is particularly important as the current regulated pricing system will be replaced by a system where purchaser/refiners will be posting prices to reflect market conditions for Saskatchewan's crude production delivered to a designated point. After more than a decade of regulated pricing, decontrol of oil prices is scheduled to occur during the upcoming fiscal year.

The branch continues to administer both the New Oil Reference Price (NORP) and the Special Old Oil Price (SOOP) programs which are funded by the federal government to provide world pricing to eligible oil production in the province. As new wells are drilled and completed for production, the branch is responsible for determining its eligibility and for providing pertinent data to facilitate the monthly supplement funding calculations. During the fiscal year, over 2,000 wells were reviewed and approved. Under these two programs, about two thirds of Saskatchewan's crude production from over 9,750 wells is eligible to receive the world price. This represents a gross supplemental revenue in excess of $332 million to both oil producers and the province for the fiscal year under review. Cumulative revenue for the two programs since their inception in 1982 is now over $629 million.

The branch has an on-going responsibility to review and assess the average crude oil qualities established for new and existing oil pools in the province to ensure equitable world pricing for about 66 percent of the province's oil production. During the fiscal year, the large volume of wellhead crude oil analyses received has enabled the branch to establish average qualities for several new pools and to update the qualities for a number of existing pools.

Under the Crude Oil Export Charge Revenue Sharing program, the branch carried out a comprehensive review of a number of amendments to existing revenue sharing procedures as well as negotiations with the National Energy Board and other provincial governments on new export revenue sharing procedures to ensure the province's continued fair share of the export charge revenue which currently averages approximately $8 million monthly.

The branch participated in the department's discussions with industry associations on the design and development of the oil and gas revenue billing system. The direct billing system which will replace the present reporting system for the collection of oil and gas revenue will be implemented to coincide with oil price deregulation during the coming fiscal year.